Halo Technology

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Category: Halo
Language: English
Status: In-Progress
Published: 2011-08-21 22:48:33
Updated: 2011-08-21 22:48:33
Packaged: 2016-04-27 01:57:06
Rating: K
Chapters: 4
Words: 8,219
Publisher: www.fanfiction.net
Summary: Technology of the UNSC and the Covenant Empire.

1. The UNSC Navy

The UNSC Navy is the branch of the UNSCDF responsible mostly for naval operations in space, though they sometimes operate in the oceans with their terrestrial arm. Its roles include ship-to-ship combat; orbital bombardment; the deployment of atmospheric and space fighters, and the delivery of UNSC Marines, including ODSTs, into combat.

Background

The UNSC Navy was created in the wake of the Interplanetary War of the 2160's - precisely during the Argyre Planitia Campaign of 2163, as a result of the UN need to oversee and monitor Marine deployments from space, thus forming the UNSC. The UNSC Navy is a direct descendant of the UN Navy. It is led by the UNSC Naval Command.

The UNSC has a large fleet of warships, including many capital ships and single-ship craft. The UNSC Navy sustained heavy losses of materiÃ©l and personnel throughout the war against the Covenant. Many valuable assets of the UNSC Navy were destroyed during the Fall of Reach, and a very large portion of its remaining ships were lost when the Prophet of Truth occupied Earth. At least some UNSC ship production is handled by the Reyes-McLees Shipyards, though this may no longer be true due to the Covenant invasion of the Sol System.

UNSC Navy personnel are given training in self-defense. All crewmen are trained to use the M6 series of handguns.

Armament

The primary offensive armament of all UNSC capital ships is the Magnetic Accelerator Cannon (MAC). These weapons are massive coil guns that are used to accelerate projectiles ranging in mass from 600

metric tons in the case of smaller warships, and 3,000 tons in the case of Super MAC platforms, to extremly high velocities. These projectiles are composed of Titanium-A, depleted Uranium, and/or Tungsten with a ferrous (iron) core. Super MAC platforms accelerate MAC rounds to over 40% of the speed of light or about 267,840,000 miles per hour with twenty-three linear accelerator coils, while ship-based MACs have a lower velocity. Super MAC platforms can also reload a round in 5 seconds , where as the smaller capital ships will need several minutes .

The UNSC Frigate Gettysburg is quoted as firing a 600 ton shell at 30 kilometers per second. Before Reach fell, the Pillar of Autumn was equipped with a modified MAC that could quickly fire three lighter projectiles in succession instead of just one heavier projectile. It was originally intended to allow the Pillar of Autumn a better chance of disabling a Covenant ship, which was a feature required for a mission that was later scrubbed following the Battle of Reach.

Almost all UNSC warships are equipped with Archer Missile pods for ship-to-ship engagements, which prove most effective against unshielded targets. A common tactic among UNSC ships is to disable the target's shields with MAC rounds and then pummel it with Archer missiles. UNSC ships in 2525 carried Fusion Missiles as an offensive weapon. They seem to have been removed or replaced in later years. UNSC ships may also carry "Shiva" nuclear warheads. In addition, the UNSC mounts 50mm auto-cannons on its ships for defense against enemy fighters and boarding craft, controlled by shipboard AIs. However, these auto cannons can be used against Covenant capital ships if the two ships are close enough, as displayed by the UNSC Savannah during Operation Uppercut.

UNSC warships also carry significant Marine detachments for internal security, boarding actions, and planetary assault, and carry all the equipment and materiel needed by Marine forces. It is implied that a significant portion of the interior of UNSC warships are devoted to this purpose, as there are armories and barracks that hold these supplies.

Ships of the UNSC navy also carry a number of GA-TL1 Longsword-class Interceptor. These are armed with 110mm Rotary Cannons and ASGM-10 Missiles, and sometimes a Moray Space Mine system or even a single Shiva-class Nuclear Missile. They can also be remotely-operated and used to carry a remotely-detonated Shiva missile, which, when detonated, effectively destroys both the Longsword and its selected target.

Despite all of this firepower, however, UNSC warships have great difficulty defeating Covenant ships even with a numerical advantage. It typically takes multiple hits from a ship-based MAC weapon to disable a Covenant ship's shields, although larger, ODP-based Super MACs can fire a round that can literally shatter Covenant capital ships. Archer missiles must be used in tremendous amounts to breach Covenant shield systems. Even with their shields down, Covenant ships have been noted to remain operational after multiple direct hits from normal MAC rounds. This advantage in firepower and shielding gives the Covenant an effective 3:1 ratio and better against UNSC ships.

Wet Navy

Far into the 26th Century, the UNSC Navy continued to use terrestrial ships to patrol the seas of its worlds. Little is known about this Naval arm, only that bases existed on Earth's Mombasa Quays and the fortress world of Reach. Other than that, it is known that the Navy possessed numerous UNSC Aircraft carriers with a full complement of F-99 Unmanned Combat Aerial Vehicles, suggesting that they were constantly kept at a high-level of alert.

Aside from participating in the Battle of Mombasa to some extent, the wet Navy may have also been involved with an operation in the Yucatan peninsula where the SPARTAN-II Blue Team attacked a Covenant excavation force under the Gulf of Mexico.

**UNSC Navy Officer Ranks **

Ensign - Lieutenant, Junior Grade - Lieutenant - Lieutenant Commander - Commander - Captain - Rear Admiral (Lower Half) - Rear Admiral (Upper Half) - Vice Admiral - Admiral - Fleet Admiral

**UNSC Navy Enlisted Ranks **

Crewman Recruit - Crewman Apprentice - Crewman - Petty Officer Third Class - Petty Officer Second Class - Petty Officer First Class - Chief Petty Officer - Senior Chief Petty Officer - Master Chief Petty Officer/Command Master Chief Petty Officer - Master Chief Petty Officer of the Navy

2. MJOLNIR Powered Assault Armor

MJOLNIR Powered Assault Armor is a technologically advanced combat exoskeleton system designed to vastly improve the strength, speed, agility, reflexes and durability of a SPARTAN-II or SPARTAN-III supersoldier.

Created parallel to the SPARTAN-II Program, the MJOLNIR Armor is currently the most advanced piece of tactical military hardware in human hands. Each suit alone costs as much as a small starship. The brainchild of Dr. Catherine E. Halsey, MJOLNIR is Halsey's attempt to create a powered exoskeleton capable of taking full advantage of the physical capabilities of a SPARTAN-II. The battlesuit is constructed in overlapping layers. It is a sealed system, capable of extravehicular activity or operations in toxic atmosphere. It is hardened against EMP and radiation, and has filters that are completely effective at removing toxins and bacteria from local atmosphere.

The armor's shell is composed of a multilayer alloy of remarkable strength and has been augmented with a refractive coating capable of dispersing a limited amount of Covenant energy weapon strikes. The suit contains a gel-filled layer underneath a thick black armored bodysuit. The gel layer regulates temperature and can reactively change its density. The inner skinsuit is made of a moisture-absorbing synthetic material linked to an environment control computer and the occupant's UNSC-issue neural interface. The shield is powered by a bi-polar aura that contains positively charged protons created from the over excited nuclei, which is naturally emitted from the human body. The technology to harness the power of the small energy waves of the human body was developed in the

SPARTAN-I Program. Once this shield has taken enough damage, there is no more power left to protect the spartan and they become vulnerable to direct shots.

Each human being has a molecular fiber network called the nervous system within their brain. An upgrade to the standard Neural Interface is issued to all high ranking officers; another modified version of the neural lace is issued to all SPARTAN-IIs in the UNSC. This network translates electrochemical signals to digital code and routes them through an interface connection at the rear of the skull. Through this interface, the user's thoughts command the armor's movement and weapons; and input from the on board sensors comes directly to the user's mind. The synthesis of machine and mind is so fast that it is almost impossible to chart reaction time.

Between the external armor and the internal padding is the most devastating weapon the suit carries: a layer of reactive metal liquid crystal. Woven by molecular tools into a superdense optical computer memory, this revolutionary crystalline layer forms a network, capable of supporting the kinds of artificial intelligence usually reserved for starships, a piggyback system. An A.I.'s personality and processing matrices can be carried by the armor and delivered to the suit via onboard storage in a crystal data chip no larger than a personal credit card. Such technology did not exist when work began on the Mark I prototypes. At the same time it is amorphous, yet amplifies force, doubling lifting capability and increasing reaction time by a factor of five. Unfortunately the system is so reactive that normal human beings cannot use the suit without injuring themselves. Only humans who have carbide ceramic ossification, a skeletal augmentation, such as a SPARTAN-II, can safely wear the suit.

The suit also possesses other features that enhance its wearer's abilities. It has numerous clips, belts, and magnetic holsters for the attachment of additional weapons and ammunition; an advanced Heads-Up-Display(HUD) linked to sensors in the gloves detects the type of weapon and devices held, and to project shield strength, ammunition count, a targeting reticule, waypoints, a radio uplink for communication, health monitoring and restoration system, regenerative food materials and other helpful data.

In its final phase the MJOLNIR battlesuit weighs half a ton, or 1000 Lbs and when in use, is a fully neural-linked system. With an on board A.I using the human mind for parallel processing, the SPARTAN-II/MJOLNIR combination is designed to be the most devastating intelligence tool ever created.

The armor line is named for the mythical weapon MjÃ¸lnir, the hammer of Thor, the Norse god of lightning, thunder, wind, and rain who possessed incredible power. It is said that MjÃ¶lnir had the power to level mountains. The origin of the word "MjÃ¶lnir" is unknown. The Icelandic verbs mÃ¶lva (to crush) and mala (to grind) have been suggested as possible translations. Another theory suggests that MJOLNIR might be related to the Russian word Ð¼Ð¾Ð»Ð½Ð¸Ñ• (molniya) and the Welsh word mellt (both words being translated to the term as "lightning"). This second theory parallels with the idea that Thor, being a son of the Chief God, Odin, and the God of Thunder himself, might have used lightning as his weapon.

Armor Versions

Mark I Prototype Exoskeleton

Initiated in 2512 the Mark I was one of the Navy's first experiments with powered exoskeletons - more human-powered defense structures than suits, the Mark I took 10 years to develop, but was bulky, unwieldy and needed to be tethered to a power source due to the tremendous amount of energy needed to power it. This was the downfall to the system as it required a connection to a fusion generator which hindered movement. The Mark I Prototype Exoskeleton improved the strength and stamina of the wearer and allowed a user to lift two tons (4,000 pounds) and run at 32 km/h (19.88 MPH) for extended periods of time. The Mark I contained a cutting edge on board computer that could assist the wearer by transmitting tactical and communications information to the standard neural implant issued to a soldier, the suit however did not posses the ability to carry an A.I on board. The armor could also be equipped with motion sensors, infrared scopes, and could be mounted with a 30mm mini-gun that fired on self-targeting armatures.

Research and development for the Mark I was carried out at Section Three's headquarters in the CASTLE facility on Reach, however the final assembly of components were done at the Damascus Testing Facility on Chi Ceti IV. At least forty Mark I suits were produced and although they never saw deployment on the battlefield they were later used to carry heavy equipment in docking bays, and dozens of others were dumped into Reach's titanium mines. The Mark I Exoskeletons were later used by trainers of the SPARTAN-IIs to protect themselves when training under Chief Petty Officer Mendez's orders. Otherwise the training could have killed them, as evidenced by the first day back at Reach when three trainers were accidentally killed during hand to hand combat exercises.

Mark II Prototype Exoskeleton

The Mark II Prototype Exoskeleton was similar to the Mark I, but with slimmer profile which greatly increased mobility. The suit, however, still needed to be tethered to a Fusion Generator, but despite the fact that it was the most powerful piece of military hardware at the time, it was still impractical for battlefield deployment. One of the new additions to the Mark II included a refractive coating to help disperse heat from explosive attacks and better self-sealing in the event of damage while the unit is in space.

Mark III Prototype Exoskeleton

The next prototype, the Mark III, incorporated a wireless power transmitter and receiver so that power could be transmitted directly to it, much like the Orbital Defense Platforms used to defend UNSC colonies. This design was quickly rejected for two reasons: first the armor still had a limited operational range as it had to remain within range of a bulky, immobile generator, and second, if the generator was to be knocked out it would result in the incapacitation of the suit and leave its user locked inside and helpless against enemy attacks. In the end, all of the first three prototypes had one thing in common: They were impractical on the battlefield, as large exoskeleton units did not have a substantial use in any form of combat.

MJOLNIR Mark IV Powered Assault Armor

Although earlier attempts at developing high-powered armor produced designs that were impractical for battlefield deployment, the Mark IV MJOLNIR powered exoskeleton would be the first successful powered armor that saw deployment onto the battlefield. Developed by Dr. Catherine E. Halsey, the MJOLNIR Mark IV was a radical redesign of powered exoskeletons making use of technological innovations that did not exist when work on the first MJOLNIR exoskeleton suit began. The Mark IV MJOLNIR armor was fielded November 27, 2525 to August 29, 2552.

MJOLNIR Powered Assault Armor/Black

Created by a top secret parallel development lab in Seongnam, Korea, MJOLNIR: Black was a standalone "skunkworks" variant created exclusively for Team Black. It features a number of advances over even the then-current generation Mark V and the later VI. It was used on Verge during the Covenant invasion of the Epsilon Eridani System and Operation: BLOWBACK some time after.

MJOLNIR Mark V Powered Assault Armor

The MJOLNIR Mark V is the first major upgrade of the system and introduced two revolutionary technologies for battlefield purposes: energy shielding reverse-engineered from Covenant technology, providing the user added protection against plasma weapons, and the ability to link a soldier and an AI together to provide the soldier instant intel in the field, along with other functions. In addition to major changes from the Mark IV, hundreds of other technical improvements are incorporated into the Mark V: for example, the fusion packs used to power the suits are half again the size of their predecessors. The Mark V was fielded November 24, 2551 to October 20, 2552.

In 2542, seventeen years after the MJOLNIR Mark IV entered service, production began on the next generation of MJOLNIR Armor, in order to improve SPARTAN-II/MJOLNIR effectiveness against the Covenant in combat. A team under the leadership of Chief Technical Officer Dr. Catherine Halsey would spend the next ten years developing the suit. Using data collected from the Mark IV, hundreds of minor technical improvements were made to the Mark V, the suit's armor plating underwent a total redesign and better materials were developed for its use. Separating the Mark V from the previous version of the system are two major breakthroughs in the ways in which the suit improves its wearer's combat effectiveness.

The first major difference was a major overhaul of the suit's crystalline layer which is now split into two parts. Woven by molecular tools into a superdense optical computer memory, the first reactive metal liquid crystal layer is "sandwiched" between the external armor and the internal padding. This revolutionary crystalline layer forms a network, capable of supporting the kinds of artificial intelligence usually reserved for warships, on a piggyback system. The second layer is still amorphous and amplifies force, doubling lifting capability and increasing reaction time by a factor of five. Unfortunately the system is so reactive that normal human beings cannot use the suit without injuring or killing themselves. The synthesis of an artificial intelligence with the human brain is not possible without an upgrade to the user's standard Neural Interface. This specialized version of the neural lace is issued to

all SPARTAN-IIs before they can interface with the Mark V. Like the standard Neural Interface, the specialized neural lace translates electrochemical signals to digital code and routes them through an interface connection at the rear of the skull. Through this interface, the user's thoughts command the armor's movement and weapons; and input from the on board sensors comes directly to the user's mind. In addition, an AI personality and processing matrices can be carried by the armor and delivered to the suit via the specialized neural lace and on board storage in a crystal data chip no larger than a personal credit card. Without the armor, a SPARTAN's reaction time is charted at twenty milliseconds; with the Mark V, and a AI installed, the time translating thought into motion is rendered almost instantaneous.

The second major breakthrough was the addition of a self-recharging energy shield system, reversed engineered from captured Jackal Point Defense Gauntlets, which repel objects and energy bursts, plus any other hazardous elemental energies. While impacts on the shield place a substantial drain on the system's power supply, the system's energy regenerates once the user is no longer under fire. However, the adaptation of the shield covering the entire body weakens the magnetic field, making the Mark V's shield system vulnerable to ballistic arms fire.

The suit also possesses other upgraded features that enhance its wearer's abilities. It has numerous magnetic holsters for the attachment of additional weapons, equipment and ammunition packs; an upgraded Heads-Up-Display (HUD) linked to sensors that project shield strength, an improved motion detecting system in addition to providing other numerous readouts, including allies health and shield status.

In its final phase the MJOLNIR battle suit weighs half a ton, or 1,000 Lbs. When in use and has a fully neural-linked system with an on board AI using the human mind for parallel processing. The SPARTAN-II/MJOLNIR combination is designed to be the most devastating intelligence tool ever created.

John-117 was the first Spartan to test the MJOLNIR Mark V with a Smart AI implemented within the armor during a "live-fire" combat scenario. His test was to ring a bell after going through an obstacle course. This course involved 10 ODST's, a minefield with Lotus Anti-Tank Mines, three automated 30mm chain guns, a forest of wooden poles, and an unexpected Skyhawk Aircraft utilizing four 50mm cannons and Scorpion Anti-Tank Missiles. This test showed that AI's could improve the armor's reaction times.

MJOLNIR Mark VI Powered Assault Armor

The MJOLNIR Mark VI is the third and final upgrade to the MJOLNIR system, the Mark VI once again introduces several technical improvements while refining advanced technologies introduced in the previous system. The first improvement made to the system is a faster recharge time on the suits' energy shield system so that the SPARTAN-II super soldier does not have to remain in cover for an extended period of time. The second is improved synchronization between the suit and user, this allows the SPARTAN-II to jump higher, run faster, and hit harder than a Spartan could previously. In addition, this equipment made medical kits obsolete for the SPARTAN-II because of the integration of devices that administer

medical care.

Late into the war, as work on the MJOLNIR Mark V was being completed, a top-secret parallel development lab in Seongnam, United Korea, began work on their own prototype of Project: MJOLNIR; this would later become known as MJOLNIR: BLACK, a standalone "skunkworks" prototype of the Mark VI MJOLNIR armor. Using data from the existing and in-development versions of the MJOLNIR armor, the Seongnam team was able to produce a suit with many technical advancements not yet available to the standard MJOLNIR system. After extensive testing of prototype models in combat against the Covenant, the BLACK prototype was eventually inducted into the MJOLNIR line of combat exoskeletons and officially designated as the sixth version. It was approved for use after the loss of Reach and equipped to the surviving SPARTAN-IIs from Reach after their arrival on Earth.

The MJOLNIR Mark VI is capable of taking full advantage of the physical capabilities of a SPARTAN-II. The suit is constructed in overlapping layers. It is a sealed system, capable of extra-vehicular activity and operations in toxic atmosphere. It is hardened against electromagnetic pulses and radiation, and has filters that are completely effective at removing toxins and bacteria from local atmosphere.

The armor's shell is composed of a multilayer alloy of remarkable strength and has been augmented with a refractive coating capable of dispersing a limited number of impacts from Covenant energy weapons. The suit contains a gel-filled layer underneath a thick black armored bodysuit. The gel layer regulates temperature and can reactively change its density. The inner skinsuit is made of a moisture-absorbing synthetic material linked to an environment control computer and the occupant's UNSC-issue Neural Interface.

An upgrade to the standard Neural Interface is issued to all high-ranking officers; another modified version of the neural lace is issued to all SPARTAN-IIs in the UNSC. This network translates electrochemical signals to digital code and routes them through an interface connection at the rear of the skull. Through this interface, the user's thoughts command the armor's movement and use of weapons, and input from the onboard sensors comes directly to the user's mind. The synthesis of machine and mind is so fast that it is almost impossible to chart reaction time.

Each suit of MJOLNIR Mark VI armor contains a crystalline layer. Woven by molecular tools into a superdense optical computer memory, this revolutionary crystalline layer forms a network, capable of supporting the kinds of artificial intelligence usually reserved for starships, a piggyback system. At the same time it is amorphous, yet amplifies force, doubling lifting capability and increasing reaction time by a factor of five. Unfortunately, the system is so reactive that normal human beings cannot use the suit without injuring themselves. Only humans who have carbide ceramic ossification, a skeletal augmentation, such as a SPARTAN-II, can safely wear the suit.

The Mark VI generation largely solved problems with the previous versions of MJOLNIR armor. It had an improved energy shielding system, powered by a smaller fusion pack on the wearer's back. This shield system is much stronger and charges more quickly than the Mark V's. The suit also has denser yet less bulky armor plating. These

streamlined plates have fewer grapple points than the Mark V so that an enemy has fewer advantages in close combat.

The biggest change, however, was the inclusion of automatic biofoam injectors. With the introduction of the Mark VI, these biofoam injectors have become an integral part of a SPARTAN's ability to function in battle. As a medical gel, it is used to fill and seal wounds automatically, although this process causes extreme pain. However while Biofoam allows a soldier to continue to perform his job without bleeding out, biofoam is only a temporary means of saving a person's life and medical attention must be received soon after before a person suffers more life threatening issues.

In addition, the Mark VI's liquid crystal and hydrostatic gel layers received significant improvements over the previous version. The liquid crystal layer increases the strength of the armor by a factor of five in addition to amplifying the users reaction time by the same factor. The hydrostatic layer features a lock-down device, which protects the muscles and joints of its Spartan wearer from heavy-impact injuries.

In addition to major component upgrades the Mark VI introduce a number of smaller technical improvements to components, these included recoil-compensating actuators which handle weapon feedback, as a SPARTAN is firing a weapon in combat these actuators handle a weapons recoil reducing it without affecting the performance of the Spartan user. The Mark VI also possesses an improved computer system which continuously monitors weapons, biological functions, and motion through intelligent motion-sensing radar.

The sixth and final stage in the MJOLNIR evolution, the MJOLNIR Mark VI battlesuit weighs half a ton, or 1000 Lbs and when in use, is a fully neural-linked system. With an on board artificial intelligence using the human mind for parallel processing, the SPARTAN-II/MJOLNIR combination is the most devastating intelligence tool ever created.

MJOLNIR Mark VII Powered Assault Armor

The MJOLNIR MK VII was an armor system mentioned by Dr. Halsey in her personal journal. It would appear to be the last planned phase of the MJOLNIR project. At the time the MJOLNIR project began, Halsey had planned on the MK VII suit featuring the following upgrades:

Next-gen fusion-plasma hybrid power system.

Atmospheric insertion systems.

Slipspace de-insertion capability.

Active AI transfer protocols.

Limited shaping of the energy shield (partial overlaps, airfoils etc.).

Atmospheric insertion would allow a Spartan to free-fall from space without a reentry vehicle such as the ODST's SOEIV, but would most likely require a drag chute or parachute. Note that reentry in MJOLNIR armor has been done several times in Halo fiction but is most

likely outside both the Mark V and Mark VI design specs and has proven fatal. It can be concluded that the Mark VII's systems never entered the testing phase and, after the Fall of Reach, no further work was done on the project.

Armor Components

Helmet: The MJOLNIR Helmet is one of the most vital aspects to the MJOLNIR system. It is made of Titanium and contains key features like a Heads Up Display that links to the brain and hands, and can identify equipment and display information about it when it is picked up by the wearer. Another feature is the direct neural interface system which connects to a SPARTAN-IIs neural implants. Two core processor chips are implanted into the subjects skull in the rear of the head. This is essentially comparable to an on board computer using parts of the human brain for processing - when the connector at the rear of the subjects head and receptors in the brain link to the helmets on board sensors it creates the neural link needed to move the MJOLNIR suit. The helmet also contains other equipment to protect and aid the user in hostile conditions. This includes: filters to remove toxins from the atmosphere, a supply to provide air to the wearer during EVA, thermal and motion sensors, communications, solar-powered lighting, and imaging and video gear. The helmet also contains the A.I housing, where a ship-borne A.I chip is inserted, located on the back of the helmet.

Titanium Alloy Outer Shell: The outer shell of the MJOLNIR armor is comprised of a fairly thick titanium alloy. This plating covers the chest, arms, hip, legs, calves, feet and hands. This alloy is very resilient, can take significant punishment, and is nearly impervious to small arms fire. While enough shots from armor piercing rounds will breach the outer shell, the suit can take a few glancing blows from them without compromising the armor. The outer shell of the all MJOLNIR suits is covered with a refractive coating to help disperse the heat experienced from Covenant energy weapons. However one or two direct hits from any Plasma weapon will compromise the armor plating.

Titanium Nanocomposite Bodysuit: Sandwiched between the external armor and the internal padding is a thick black armored bodysuit. This suit has numerous functions, small but vital to the safety and survival of the wearer. The bodysuit is made of a titanium-based material, making it very strong and yet very flexible. It also serves as another layer of protection against ballistics attacks and is coated with a heat resistant material to disperse heat from Plasma weapons.

Hydrostatic Gel: Underneath the armored bodysuit is a gel-filled layer, this gel layer regulates the temperature of the suit and can re actively change its density to conform to the wearer's shape - the temperature inside the suit is controlled by the moisture absorbing cloth suit underneath the hydrostatic layer. The hydrostatic gel layer can also be pressurized to various levels to potentially save the wearers life should the wearer be subjected to high G forces or a high velocity impact; however, over pressurizing this layer can cause nitrogen embolisms.

Reactive Metal Liquid Crystal Layer: Sandwiched between the external armor and the internal padding, the liquid crystal layer of the suit is split into two sections that forms the inner structure of

the suit. The first layer contains the Reactive Metal Liquid Crystal this reactive metal increases the strength, reaction time, mobility, speed, and all around physical performance of the SPARTAN-II. The section layer supports suit's artificial intelligence, knitted together at a molecular level and fitted in between the outer plates and the inner padding. This type of computer memory is usually outfitted on a warship and as such this layer accounts for over eighty percent of the MJOLNIR armor's cost of construction and materials.

Magnetic Weapon Holder Strips: Available on the Mk. IV, Mk. V, and Mk. VI the magnetic strips are very small yet powerful magnets place on the legs, waist, and back of the suit and is used to hold any equipment with a magnetic property. The suit also contains an electromagnetic system on the boots of the MJOLNIR suit that allow its wearer to stay attached to a metal surface in Zero G environments and can be toggled on or off by the wearer.

Shields: First used on the Mk. V, and later refined on the Mk. VI, the energy shield device is reversed engineered from Covenant technology. Begun in 2532 forty scientists and technicians would spend the next 20 years attempting to make some use of the technology. For decades the attempts at cracking their technology had met with failure after failure, some had given up and others in the scientific community believed the energy shield technology could never be cracked. However at some point before 2552 a breakthrough was made and for the first time the UNSC had successfully cracked and improved upon the technology.

Pressure Seal: The Pressure Seal is a vital component to the MJOLNIR system, it keeps the system airtight, underwater or in space. The seal is very strong and will only break under extreme pressure, such as in a high velocity impact or when the Hydrostatic Gel has been over pressurized.

Automatic Biofoam Injectors: Introduced on the Mk. VI models Biofoam injectors is an integral part of the systems ability to keep a SPARTAN-II functioning in battle. Biofoam is a medical gel that is used to fill and seal a wound automatically, it is also used to treat any infection that could occur as a result of the wound. The process of injecting, or applying the gel to a wound is extremely painful and is only a temporary solution; medical attention must be sought soon after to ensure survivability.

Fusion Reactor: The fusion reactor is the most essential part of the MJOLNIR System, as it provides power to all equipment on the MJOLNIR armor - the reactor is built into the suit and allows for nearly unlimited movement. The fusion reactor in all versions of the MJOLNIR armor are half the size of a normal fusion pack that conventional marines carry around.

Force-Multiplying Circuits: Located throughout the armor, these systems boost the force applied by the user. They make hand-to-hand combat easier, but also make the armor difficult to adjust to; a slight motion can be translated into a potentially harmful one if not conducted correctly. For this reason it is only possible for Spartans to use this armor, as their strengthened bodies are able to withstand the increased power and speed of movement, which, in un-augmented human bodies, results in broken bones or death, due to spasms caused by the pain of broken bones.

Reactive Circuits: Reactive Circuits are systems installed directly linked to the Spartan Neural Interface. They amplify the wearer's reaction time by connecting directly to the thoughts of the wearer, making it much easier to control and allowing for the soldier to be both more efficient and have a higher survival rate in combat.

Power Supply Control Unit: The Power Supply Control Unit controls the power supply of the armor.

3. Type1 Energy WeaponSword

"_A noble and ancient weapon, wielded by the strongest of Sangheili, requires great skill and bravery to use, and inspires fear in those who face its elegant plasma blade._"

â€” then-Supreme Commander Thel 'Vadamee

The **Type-1 Energy Weapon/Sword**, commonly known as the **Energy Sword**, is a close quarters weapon of the Covenant Empire exclusively used by the Sangheili.

Design Details

The Type-1 Energy Weapon/Sword consists of a curved hilt, which houses an energy storage and generation device, as well as the blade projector; that forms a blade of superheated plasma, stabilized by two small magnetic field generators built into the handle of the weapon â€” this forms and contains the oval shaped, ionized blades for which the weapon is recognized. The battery's energy is reduced for each successful strike. Each strike from the sword will drain the battery by 10% of its maximum energy output. Once the battery power is fully depleted, the sword will deactivate unless recharged, which is impossible in the games.

The Type-1 Energy Weapon contains a failsafe mechanism that can permanently disable the weapon if the Sangheili wielding it drops it. When dropped, the failsafe engages by deactivating the magnetic field before dispersing the plasma. The plasma then consumes the handle and thus destroys the weapon. The failsafe is included to prevent enemy infantry from acquiring the weapon and using it, and is yet another insight to Sangheili tactics.

The energy sword is the signature weapon of the Sangheili, and has been their weapon of nobility since its creation during one of their Ages of Discovery. Viewed as a holy weapon the Sangheili pride themselves on their skills with this weapon and believe that it is better for a Sangheili to fall on his sword as an act to redeem his honor or to die by it. The Sangheili are also very strict on who can be trained in the art of swordsmanship - only aristocrats are permitted to wield energy swords and sword wielders are no longer eligible for marriage. Although Fal 'Chavamee was a skilled swordsman and instructor, despite being married it is unknown how his aristocrat status was enforced or if this was changed as a result of his actions. Breeding with any female they choose is permitted, married or otherwise, to ensure successful transmission of "swordsman" genes. In service to the Covenant, Sangheili of a high or important rank are permitted to wield this weapon - lower ranks are

not permitted to wield the sword because of its high status. In the Covenant, Sangheili Zealots, Special Operations Sangheili, Stealth Sangheili and Sangheili Honor Guardsman, are permitted to use energy swords.

Advantages

The Type-1 Energy Weapon is an extremely powerful and effective melee weapon in close quarters combat. A single strike can penetrate through the energy shield systems and into the armor and flesh of a Spartan or a Sangheili. This is due to the design of the weapon which utilizes ionized gas rather than traditional shaped, solid matter. Because the Type-1 Energy Weapon lacks any solid material in which to hold, or impale anything, the sword does not cut or carve in the traditional sense, but rather boils anything it comes into contact with, this allows the weapon to pass though any type of material including the toughest metal with ease.

Injuries to living creatures by the Type-1 Energy Weapon can range from bad to gruesome. Stabs wounds by the Type-1 Energy Weapon are, in most cases, fatal â€” as the blade passes through the body, the innards of the body are burned and cauterized by the extreme temperatures produced by the blades. Body fluids in the area of the stab wound are flash vaporized upon contact â€” organs within the area of the stab wounds can suffer life threatening damage dependent upon the type of organ struck, effects of fluids trapped in organs or arteries in addition to the expansion of heat would cause ruptures or small explosions causing additional damage to the victim. Survival is minimal at best and in the case of non-vital organs being stabbed with the energy sword, proper medical treatment must be applied as soon as possible to ensure long term survival. Because of the swords sheer destructive power, dismemberment is another common form of fatality to victims, ranging from decapitation to bodies being sliced in half. Loss of limbs is a common injury, while not always fatal, it will disable a victim.

The sheer destructive power of the sword makes it a weapon to be feared on any battlefield and it is known for its physiological effects on human soldiers.

Disadvantages

The Type-1 Energy Weapon's main disadvantage is that it is purely a close-quarters weapon, any weapon outside of the effective range puts the wielder at risk. It is for this reason the Sangheili approach sword combat on the battlefield in two different ways, by funneling the enemy into close-quarters to allow them to strike, or to apply a form of stealth using both technology and technique. Without these, the Sangheili is vulnerable to attack by different types of weapons both human and Covenant. Infantry with over-shielding are also more resistant when facing this weapon as it can take two strikes before the shield system fails.

The Type-1 Energy Weapon is also vulnerable to other magnetic fields, as they can block, disrupt, or possibly even alter the functionality of the sword. Two energy swords clashing together create a small disruption of energy as a result of the same type of magnetic fields clashing together, this clash has a slight area of effect damage that can affect the combatants.

Like most other Covenant weapons, the Type-1 Energy Weapon is battery powered, requiring the user to either recharge the weapon or discard it when the power is depleted. Although the handle can be used as a club, the Energy Sword's combat effectiveness at that point is minimal. The strength and lethality of the sword in the games are compensated for the sake of gameplay.

Changes

Changes from Halo: Combat Evolved to Halo 2

In Halo: Combat Evolved, the energy sword has a cyan glow, a far less defined edge and makes a dull clunk when striking an object. It is only used by Stealth Sangheili and Zealots. The player cannot wield the energy sword due to the failsafe mechanism device that destroys the weapon upon killing the sword-wielder.

In Halo 2, the energy sword is blue with purple undertones and electrical energy crackling on it when the blade is activated. The white glow seen in Halo: Combat Evolved is also replaced with a more glass like transparency. In the campaign, it is only used by higher-ranking Sangheili, such as special operations units, Ultras and Zealots, though players can now wield the sword. The sword in campaign has a battery and can only be used effectively against a limited number of enemy forces before the battery runs out. The sword is usable in multiplayer with an infinite battery power. The Energy Sword has two modes of attacking; a lunge attack and a swing attack.

Changes from Halo 2 to Halo 3

In Halo 3, the sword has more of a light cyan tinge, similar to its appearance in Halo: Combat Evolved, but still has a tint of purple near the handle. It also has an angle near the handle, whereas in the two previous games it was curved. Players are now able to parry with the sword. The power exerted by the swords hitting each other will drain both players' shields, but will not kill them unless one makes the fatal blow. The sword's lunge attack has been reduced for balancing purposes, aside from these changes in design and functionality, the power of the sword remains unchanged. In multiplayer, the sword has a limited battery supply.

Changes from Halo 3 to Halo: Reach

In Halo: Reach, the sword resembles closely to the design used in Halo: Combat Evolved, albeit darker in color. When activated, the sword is capable of lighting up the surrounding area. When unused, the sword rests differently on the SPARTAN and Sangheili character models. The energy sword appears to have been balanced out compared to its earlier incarnations, having a slightly faster swing than its Halo 3 incarnation. Its lunge attack has been reduced in range and can now be blocked by a well-timed melee. The energy sword has its own assassination animations, which are used in place of the SPARTAN combat knife and the Sangheili energy blade. Elites also hold the sword farther back than Spartans do and actually hunch down slightly when they switch to the sword. The sword can now also be lowered using the Alert carry trick. The Energy Sword now has a "swing time" of about 1.5 seconds in which an object or player in front of the sword can take damage, allowing the player to kill enemies by swinging then moving into an enemy, rather than a lunge, where a

player will move to an enemy before striking. Finally, it appears that the Energy Sword always does the same damage, regardless of whether the hit is a melee or a lunge.

Production information

Manufacturer - Covenant Empire

Model - Type-1

Type - Energy Weapon/Sword

Technical specifications

Size - Handheld, Single-handed

Energy Sword (_Halo: Combat Evolved_)

length: 1.265 metres (4.15 ft)

width: 45 centimetres (18 in)

thickness: 9.3 centimetres (3.7 in)

Energy Sword (_Halo 2_)

length: 1.317 metres (4.32 ft)

Weight: 2.36 kilograms (5.2 lb)

Damage Per Hit - 1 and 2/3 of shield, fatal if lunge, (Instant death in Halo: Combat Evolved)

Maximum Ammunition - 100 battery units

Fire Mode - Melee

Ammunition Type - Plasma

Operation - Close quarters combat

Usage

Affiliation - Covenant Empire, Covenant Separatists

4. Magnetic Accelerator Cannon

"_That MAC gun can put a round clean through a Covenant Capital Ship._"

â€” Sergeant Johnson, talking to the Master Chief on board the Orbital Defense Platform _Cairo_

The Magnetic Accelerator Cannon, also known as Mass Accelerator Cannon, MAC Gun and MAC Cannon, is a large coilgun that serves as the primary offensive weapon for UNSC warships. Larger versions, nicknamed _"Super"_ MACs or the _"big stick"_, of these are used as orbital defense platforms. MAC guns are the only non-nuclear weapons in the UNSC arsenal capable of effectively reducing or destroying

Covenant capital ships' energy shields. Smaller shipborne versions can take as many as three hits to overload a shield while an orbital platform can put a hole through any Covenant vessel even with fully charged shields. The Magnetic Accelerator Cannon should not be confused with the railgun, despite their superficial similarities.

Overview

The operation principle of a MAC is the same as that of a coilgun. The cannon fires a massive metal projectile using a linear system of magnetic fields coils down a long shaft, increasing the projectile's velocity until it carries an incredible amount of kinetic energy. The ship-based models use ferric, ferrous, or depleted uranium cores, while orbital platforms and station-based versions use ferric tungsten rounds.

Mounting

The size of a Magnetic Accelerator Cannon is such that it is normally an integral component of a warship's structure. Some types of Defense Stations are literally built around the massive weapon for orbital defense.

Ammunition

A standard ship-based MAC fires slugs of either ferric Tungsten or depleted Uranium at around 30,000 meters per second.[2] The high muzzle speed gives the 600-ton slug the kinetic energy and momentum necessary to damage a target and partially mitigates the unguided nature of the slug and its lack of maneuverability. Orbital Defense Platforms fire a 3,000-ton slug at point four-tenths the speed of light, around 120,000 kilometers per second.

Aiming

Magnetic Accelerator Cannons are built into the superstructure of a ship or weapons platform, requiring that it maneuver in order to aim the weapon. Shipboard versions generally require an AI to aim the cannon, as the projectiles are unguided and are extremely hard to aim by manual fire. Orbital platforms have dedicated targeting computers.

Firing

The firing process uses electromagnetism to fire a ferromagnetic-tungsten slug at high velocity. An extremely large amount of current is put through the first solenoid (coil of conducting wire) which creates a strong magnetic field which attracts the metal slug. As the slug passes into the solenoid, the solenoid is quickly turned off and the second solenoid, which is further up, turns on, which attracts the now high velocity metal slug just like the first solenoid, and the process is carried on. By the time the slug is fired out the end of the barrel it has been accelerated to a speed of approximately 30,000 meters per second for a ship-based MAC and around 120,000 kilometers per second for a "Super" MAC. For ODP, a pair of thrusters on the bottom side of the station fire for a couple of seconds to counteract the acceleration imparted to the station. It normally takes five seconds to recharge the capacitors as well as load the slug, which is why boarding craft are usually

deployed to take the stations out.

Types

Standard Magnetic Accelerator Cannon

The standard ship-mounted MAC fires a 600-ton ferric-tungsten projectile with a depleted uranium core at 30,000 meters per second. The large amount of energy needed to fire the weapon is particularly onerous on a warship, and the extended recharge time is a significant factor in combat against Covenant warships as multiple MAC rounds are required to penetrate Covenant shields. At 1.17 teratons of energy per shot a single ship based MAC round can destroy any unshielded Covenant ship in one shot.

Shipborne MAC draw power from the ship's reactor and require a charge of the weapon's magnetic coils in order to be fired. According to Halo: the Fall of Reach it takes three shots from the standard MAC cannon to effectively lower the shields of a covenant ship and destroy it. The time it takes to bring the MAC's systems to full charge on a UNSC vessel is the deciding force in a conflict. Thus, while a vessel may not run out of ammunition for a long time (depending on the size/weight of the shots and the capacity of the ship), a captain or commander has to carefully analyze the situation of a battle and use his shots strategically. The weapon can be fired even when not at full charge, but the range and velocity of the projectile is greatly diminished.

An average UNSC frigate sports one MAC system, while a standard destroyer possess two. UNSC cruisers carry two and UNSC carriers carry an unknown number of these powerful projectile weapons.

Modified MAC

When the UNSC ship Pillar of Autumn was refitted for the war against the Covenant, it received the latest version of the ship-based MAC weaponry. Magnetic field recyclers coupled with booster capacitors allowed the cannon to be fired three times per full charge, unlike traditional shipborne MAC systems, which could only fire once per charge. The Pillar of Autumn also carried new lighter MAC rounds that had a less dense ferrous core, but a harder outer layer of tungsten carbide. This technology is only possessed by the Pillar of Autumn and is never seen in gameplay. Also, the Pillar of Autumn's MAC charges up faster than normal UNSC MAC cannons, most likely due to the Pillar of Autumn's advanced reactor(s).

End
file.